ES 1.0 Executive Summary

The 2002 Site Environmental Report provides stakeholders with the results from the Fernald site's environmental monitoring programs for 2002, along with a summary of the U.S. Department of Energy's (DOE's) progress toward final remediation of the site. In addition, this report provides a summary of the Fernald site's compliance with the various environmental regulations, compliance agreements, and DOE policies that govern site activities. All information presented in this Executive Summary is discussed more fully within the body of this summary report and the supporting appendices. This report has been prepared in accordance with DOE Order 5400.1, General Environmental Protection Program, and the Integrated Environmental Monitoring Plan (IEMP), Revision 2 (DOE 2001).

During 2002 DOE and Fluor Fernald, Inc., the prime contractor for the Fernald site, made considerable progress toward final cleanup goals established for the site. A wide range of environmental remediation activities continued during the year, including:

- Excavation and shipment of contaminated waste pit material to an off-site disposal facility (Operable Unit 1).
- Large-scale excavation of contaminated soil (Operable Unit 5) and materials from the southern waste units (Operable Unit 2) and former production area.
- Placement of contaminated soil and debris in the on-site disposal facility (Operable Unit 2).
- Decontamination and dismantlement of former production buildings and support facilities (Operable Unit 3).
- Start-up of the Radon Control System (RCS) (Phase I) in support of the Accelerated Waste Retrieval Project for Silos 1 and 2 (Operable Unit 4).
- Extraction and treatment of contaminated groundwater from the Great Miami Aquifer (Operable Unit 5).

Several important milestones toward remediation of the Fernald site were reached in 2002. The disposition of 31 million pounds (14 million kilograms [kg]) of nuclear material was completed, the majority through transfers to other government and private sector facilities. Two new on-site disposal facility cells (Cells 4 and 5) were opened for waste placement. Twenty-three building structures were demolished bringing the total to 119 of 298 structures. The first phase of the Waste Storage Area Module (groundwater pumping) began with the extraction of contaminated groundwater.

The following sections highlight the results of environmental monitoring activities conducted during 2002.

ES 1.1 Liquid Pathway Highlights

ES 1.1.1 Groundwater Pathway

The groundwater pathway at the Fernald site is routinely monitored to:

- Determine capture and restoration of the total uranium plume, as well as non-uranium constituents, and evaluate water quality conditions in the aquifer that indicate a need to modify the design and/or operation of restoration modules.

- Meet compliance-based groundwater monitoring obligations.

During 2002 active restoration of the Great Miami Aquifer continued or was initiated within each of the following groundwater restoration modules:

- South Field Extraction (Phase I) Module - continued pumping from nine extraction wells. During 2002 one extraction well was shut down (December 2002) and one more was added and began pumping in 2002.

- South Plume/South Plume Optimization Module - continued pumping from six extraction wells.

- Waste Storage Area (Phase I) Module – began pumping from three new extraction wells that became operational in 2002.

- Re-Injection Module - continued injecting water into the aquifer for most of the year via three re-injection wells. Two of the re-injection wells were not operating for much of the year due to an increased frequency of residual plugging and were replaced with newly installed re-injection wells. Both new re-injection wells were operated briefly in November.

In addition, approximately 120 monitoring wells were sampled at various frequencies to determine water quality. Water elevations were measured quarterly in approximately 140 monitoring wells. The following highlights describe the key findings from the 2002 groundwater data:

- 2,287 million gallons (8,656 million liters) of groundwater were pumped from the Great Miami Aquifer and 241 million gallons (912 million liters) of water were re-injected into the aquifer. As a result of these restoration activities, 1,225 pounds (556 kilograms) of uranium were removed from the aquifer.

- The results of 2002 groundwater capture analysis and monitoring for total uranium and non-uranium constituents indicate that the design of the enhanced groundwater remedy for the aquifer restoration system is appropriate for capture of the plume. Ongoing refinement of the wellfield configuration continued based on new monitoring data, particularly in the eastern, on-property portion of the South Field area. Installation of additional extraction wells was necessary to support the accelerated aquifer remediation schedule.

- Pumping of the South Plume/South Plume Optimization Module continued to meet the objective of preventing further southward migration of the southern total uranium plume beyond the extraction wells.

- Re-injection remains a viable component of the groundwater remediation strategy, as efforts to alleviate plugging of the re-injection wells appears to be effective.

- Pumping from the three Waste Storage Area (Phase I) Module extraction wells began during 2002 and sampling from nine new monitoring wells was initiated.

- Leak detection monitoring at Cells 1, 2 and 3 of the on-site disposal facility indicates that all the individual cell liner systems are performing within the specifications outlined in the approved cell design.

ES 1.1.2 Surface Water and Treated Effluent Pathway

Surface water and treated effluent are monitored to determine the effects of Fernald remediation activities on Paddys Run, the Great Miami River, and the underlying Great Miami Aquifer; and to meet compliance-based surface water and treated effluent monitoring obligations. In addition, the results from sediment sampling are discussed as a component of this primary exposure pathway.

In 2002, 16 surface water and treated effluent locations were sampled at various frequencies and 16 sediment locations were monitored. The following highlights describe the key findings from the 2002 surface water, treated effluent, and sediment monitoring programs:

- The uranium released to the Great Miami River through the treated effluent pathway was an estimated 524 pounds (238 kg), below the limit of 600 pounds (272 kg) per year. Uranium released through the uncontrolled runoff pathway was estimated at 127 pounds (58 kg). Therefore, the total amount of uranium released through the treated effluent and uncontrolled surface water pathways during 2002 was estimated to be 653 pounds (296 kg).

- No surface water or treated effluent analytical results from samples collected in 2002 exceeded the final remediation level for total uranium, the site's primary contaminant. Final remediation level exceedances were limited to four constituents, while benchmark toxicity value exceedances were limited to one constituent. These occasional, sporadic exceedances are expected to occur until site remediation is complete.

- Discharges were in compliance with effluent limits identified in the current National Pollutant Discharge Elimination System (NPDES) Permit well over 99 percent of the time during 2002.

- The 2002 sediment data showed concentrations within historical ranges, and there were no final remediation level exceedances.

ES 1.2 Air Pathway Highlights

The air pathway is routinely monitored to assess the impact of Fernald site emissions of radiological air particulates, radon, and direct radiation on the surrounding public and environment. In addition, the data are used to demonstrate compliance with various regulations and DOE Orders.

ES 1.2.1 Radiological Air Particulate Monitoring

- Data collected from the network of 17 fenceline and two background air monitoring stations showed that the annual average radionuclide concentrations were all less than one percent of DOE-derived concentration guidelines contained in DOE Order 5400.5, Radiation Protection of the Public and the Environment.

- The maximum effective dose at the fenceline from 2002 airborne emissions (excluding radon) was estimated to be 0.8 millirem (mrem) per year and occurred at AMS-3 along the eastern fenceline of the site. This represents eight percent of the annual National Emission Standards for Hazardous Air Pollutants Subpart H limit of 10 mrem per year. For comparison, the 2000 and 2001 maximum effective dose was 1.1 mrem and 0.8 mrem, respectively.

- As in 2000 and 2001, thorium-230 continued to be the major dose contributor to the air inhalation dose in 2002. This is the result of fugitive emissions from the Waste Pits Remedial Action Project operations where thorium-230 is the primary isotope of concern.

ES 1.2.2 Radon Monitoring

As with previous years, a network of 34 continuous radon monitors was used for determining compliance with the applicable limits during 2002. The annual average radon concentration recorded at the site's property boundary ranged from 0.2 picoCuries per liter (pCi/L) to 0.5 pCi/L (inclusive of background concentrations). The annual average background concentration measured in 2002 was 0.2 pCi/L. Property boundary results were well below the DOE radon standard of 3.0 pCi/L above background concentrations.

- The annual average radon concentrations in the vicinity of Silos 1 and 2 (Operable Unit 4) during 2002 were comparable to the average concentrations measured in 2001. There were 10 exceedance events of the DOE limit of 100 pCi/L in 2002, compared to 15 exceedance events in 2001. As in past years, these exceedance events were observed during periods of atmospheric inversion.

- Radon concentrations within the headspace of Silos 1 and 2 were stable compared to 2001 levels. This is in contrast to slowly increasing headspace radon concentrations observed from 1991 to 2001, likely a result of the protective layer of bentonite clay (placed over the silo material in 1991 to lower headspace concentrations) that may have dried and reduced the effectiveness.

ES 1.2.3 Direct Radiation Monitoring

Direct radiation measurements were continuously collected at 37 locations at the Fernald site and at background locations. As in years past, the direct radiation levels observed in 2002 indicate that the highest measurements were obtained in proximity to Silos 1 and 2. The direct radiation measurements near Silos 1 and 2 were approximately the same as 2001 measurements. This correlates with the stable radon concentrations and associated decay products in the headspaces of these silos as observed during 2002.

ES 1.3 Estimated Dose for 2002

In 2002 the maximally exposed individual living nearest the Fernald site in a west direction could have hypothetically received a maximum dose of approximately 14.8 mrem. This estimate represents the maximum incremental dose above background attributable to the site and is exclusive of the dose received from radon. The contributions to this all-pathway dose were 0.6 mrem from air inhalation dose and 14.2 mrem from direct radiation. This dose can be compared to the limit of 100 mrem above background for all pathways (exclusive of radon) that was established by the International Commission on Radiological Protection and adopted by DOE.

ES 1.4 Natural Resources

Natural resources include the diversity of plant and animal life and their supporting habitats found in and around the Fernald site. During 2002 the following primary activities associated with natural resource monitoring and restoration occurred.

- The Area 2, Phase I Southern Waste Units Restoration Project was initiated to expand the riparian corridor along Paddys Run, create several open water and wetland areas, and establish the early stages of forest communities in upland areas. Soil amendment work was completed and half of the planned tree and shrub plantings were completed.

- The Area 1, Phase I Northern Pine Plantation Restoration Project commenced with the completion of clearing 19 acres of pine trees. The majority of grading and seeding was completed, and about one third of new trees and shrubs were planted. The objective for this area is enhancement by increasing the diversity of vegetation and creating new wetland and vernal pool features.

- The Area 2, Phase III restored area was planted with over 2,000 wetland shrubs in response to reduced survival in the wetland mitigation project area in Area 1, Phase I.

Fernald also has a number of archeological and historical sites representative of the cultural resources of the area. To protect these valuable resources, cultural resource surveys are conducted prior to soil excavation activities in designated areas of the site. During 2002 no archeological surveys were performed. Several unexpected discoveries of cultural resources occurred during 2002 remediation activities although none were significant and no impacts to cultural resources occurred.

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